IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	)
Lawrence G. Rodriguez, et al.	) Group: 3673
Serial No.: 10/647,967	)
Filed: August 26, 2003	)
Title: TURN-BUTTON WITH LEADING HELICAL	)
END PORTION	) Examiner: C. Boswell

BRIEF OF APPELLANT

MS APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This appeal is taken from the decision of the Examiner, dated November 15, 2007, finally rejecting claims 1-6 and 8-20. Appellant timely filed a Notice of Appeal in this matter on January 30, 2008.

I. TABLE OF CONTENTS

II. REAL PARTY IN INTEREST

The real party in interest in this appeal is Newfrey, Inc., a corporation organized and existing under the laws of the State of Delaware, which owns the entire interest in this patent application as set forth in the underlying claimed invention.

III. RELATED APPEALS AND INTERFERENCES

No related Appeals or Interferences are known to the Appellant.

IV. STATUS OF CLAIMS

Pending: 1-6 and 8-20.

Canceled: 7.

Allowed: None.

Objected To: None.

Rejected: 1-6 and 8-20.

Withdrawn from Consideration: None.

On Appeal: 1-6 and 8-20.

V. STATUS OF AMENDMENTS

No Amendment was filed in response to the rejection of claims 1-6 and 8-20 in the final Office Action mailed November 15, 2007. All previously submitted Amendments have been considered and entered.

VI. SUMMARY OF CLAIMED SUBJECT MATTER

The present Summary of Claimed Subject Matter includes a summary of each claim, including reference to Appellant's specification by page and line number, and reference to Appellant's drawings.

1. A lockset (10), comprising: (Page 2, lines 21-24; Fig. 1)

a lock mechanism (14) having an aperture (34); (Page 2, lines 30-33; Fig. 1)

an operator (16); (Page 2, lines 22-24; Fig. 1) and

a turn-button (12) mounted in said operator (16), (Page 2, line 24) said turn-button (12) including:

a head portion (20); (Page 2, lines 25-26; Figs. 1 and 2) and

a shaft (22) extending from said head portion (20), (Page 2, lines 25-26; Figs. 1 and 2) said shaft (22) having a leading helical end portion (26) that engages said aperture (34) of said lock mechanism (14). (Page 2, lines 27-28; Page 3, lines 31-33; Figs. 1 and 2)

2. The lockset (10) of claim 1, said leading helical end portion (26) having a plurality of leading helical surfaces (40) that taper and twist from a transition line (42) of said shaft (22) toward a tip end (44) of said shaft (22). (Page 3, lines 3-5; Figs. 1 and 2)

3. The lockset (10) of claim 2, wherein said plurality of leading helical surfaces (40) smoothly transition between adjacent helical surfaces (40). (Page 3, lines 5-7; Figs. 1 and 2)

4. A turn-button (12) for a lockset (10), comprising: (Page 2, lines 21-24; Fig. 1)

a head portion (20); (Page 2, lines 25-26; Figs. 1 and 2) and

a shaft (22) extending from said head portion (20), (Page 2, lines 25-26; Figs. 1 and 2) said shaft (22) having a leading helical end tip (26, 44). (Page 2, lines 27-28; Page 3, lines 3-5; Figs. 1 and 2)

5. The turn-button (12) of claim 4, said leading helical end tip (26, 44) having a plurality of leading helical surfaces (40) that taper and twist from a transition line (42) of said shaft (22) toward a tip end (44) of said shaft (22). (Page 3, lines 3-5; Figs. 1 and 2)

6. The turn-button (12) of claim 5, wherein said plurality of leading helical surfaces (40) smoothly transition between adjacent helical surfaces (40). (Page 3, lines 5-7; Figs. 1 and 2)

7. (Canceled)

8. The lockset (10) of claim 1, said lock mechanism (14) including a rotatable actuator (32) having said aperture (34), wherein once said leading helical end portion (26) engages said aperture (34), a rotation of said turn-button (12) effects a corresponding rotation of said rotatable actuator (32) of said lock mechanism (14). (Page 2, lines 30-34; Page 3, lines 13-15; Figs. 1, 2 and 3)

9. A lockset (10) comprising: (Page 2, lines 21-24; Fig. 1)

a lock mechanism (14) including an actuator (32) having an aperture (34); (Page 2, lines 30-33; Fig. 1)

an operator (16); (Page 2, lines 22-24; Fig. 1)

a turn-button (12) mounted in said operator (16), said turn-button (12) including a shaft (22); (Page 2, lines 24-26; Figs. 1 and 2) and

means (26, 36, 40, 44) for facilitating self-alignment of said shaft (22) of said turn-button (12) with said aperture (34) of said lock mechanism (14) as said shaft (22) of said turn-button (12) is inserted into said aperture (34) of said lock mechanism (14), said means (26, 36, 40, 44) including a plurality of leading helical surfaces (40) that taper and twist from a transition line (42) of said shaft (22) toward a tip end (44) of said shaft (22). (Page 3, lines 3-15; Figs. 1, 2 and 3)

10. The lockset (10) of claim 9, wherein said plurality of leading helical surfaces (40) smoothly transition between adjacent helical surfaces (40). (Page 3, lines 5-7; Figs. 1 and 2)

11. The lockset (10) of claim 1, wherein said operator (16) is one of a door knob and a door lever, (Page 2, line 23; Fig. 1) said shaft (22) of said turn-button (12) extending from said head portion (20) through said one of said door knob and said door lever (16) to engage said aperture (34) of said lock mechanism (14). (Page 2, lines 25-33; Page 3, lines 8-15; Figs. 1, 2 and 3)

12. The lockset (10) of claim 1, wherein a rotation of said turn-button (12) effects a corresponding rotation of said aperture (34) of said lock mechanism (14). (Page 2, lines 30-34; Page 3, lines 13-15; Figs. 1 and 2)

13. The lockset (10) of claim 1, wherein said aperture (34) of said lock mechanism (14) has a substantially rectangular shape. (Page 2, line 34-Page 3, line 2; Fig. 3)

14. The lockset (10) of claim 2, wherein a number of said plurality of leading helical surfaces (40) is greater than two. (Fig. 2)

15. The turn-button (12) of claim 4, wherein a perimeter (28) of an elongate portion (24) of said shaft (22) has a substantially rectangular shape. (Page 2, lines 27-29; Figs. 1 and 2)

16. The turn-button (12) of claim 5, wherein a number of said plurality of leading helical surfaces (40) is greater than two. (Fig. 2)

17. The lockset (10) of claim 9, wherein said operator (16) is one of a door knob and a door lever, said shaft (22) of said turn-button (12) extending through said one of said door knob and said door lever (16) to engage said aperture (34) of said lock mechanism (14). Page 2, lines 25-33; Page 3, lines 8-15; Figs. 1, 2 and 3)

18. The lockset (10) of claim 9, wherein said aperture (34) of said lock mechanism (14) has a substantially rectangular shape. (Page 2, line 34-Page 3, line 2; Fig. 3)

19. The lockset (10) of claim 9, wherein a number of said plurality of leading helical surfaces (40) is greater than two. (Fig. 2)

20. The lockset (10) of claim 1, wherein said leading helical end portion (26) forms a plurality of side surfaces (40) of said shaft (22). (Page 3, lines 3-5; Figs. 1 and 2)

VII. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Claims 1-6 and 8-20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,335,950 (Mirshafiee, et al.) in view of U.S. Patent No. 4,108,482 (Dietrich, et al.).

VIII. ARGUMENT

A. CLAIMS 1-6 AND 8-20 ARE PATENTABLE OVER MIRSHAFIEE, ET AL. IN VIEW OF DIETRICH, ET AL. UNDER 35 U.S.C. § 103(a)

In the Final Office Action mailed November 15, 2007, claims 1-6 and 8-20 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,335,950 (Mirshafiee, et al.) in view of U.S. Patent No. 4,108,482 (Dietrich, et al.).

"A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. §103(a).

As set forth below, Appellant submits that claims 1-6 and 8-20 are patentable over Mirshafiee, et al. in view Dietrich, et al. under 35 U.S.C. §103(a).

1. MIRSHAFIEE, ET AL.

Mirshafiee, et al. discloses an interior knob 24 that receives a knob insert 26 to facilitate assembly of other elements therewith. (Column 2, lines 42-44; Figs. 1-4). A turn button 140 has a square shank 142 which is located within an axial opening 144 of knob 24 and into square opening 136 of spindle 134. (Column 3, lines 45-47; Figs. 1 and 4).

2. DIETRICH, ET AL.

Dietrich, et al. discloses, "An outside spindle 37, non-circular in cross section, has an axially slidable engagement with the outside knob 35, but due to its non-circular shape and fitting within a non-circular opening 38 is in non-rotatable engagement with the knob

35." (Column 2, lines 50-55; Fig. 1). The inside end of the spindle 37 is provided with a conical end which results in an oblique face 75 serving as a cam follower. (Column 4, lines 4-8; Fig. 1). "A corner 76 on the reduced end portion [71 of the locking slide 60] serving as a cam surface is adapted to engage the oblique face [75], acting as a cam track or cam way when the locking slide [60] is shifted inwardly to locking position. The camming action thus created serves to shift the outside spindle 37 axially outwardly." (Column 4, lines 8-14; Fig. 1).

3. CLAIM 1 IS PATENTABLE

Claim 1 is directed to a lockset, and recites, "a lock mechanism having an aperture; an operator; and a turn-button mounted in said operator, said turn-button including: a head portion; and a shaft extending from said head portion, said shaft having a leading helical end portion that engages said aperture of said lock mechanism." (Emphasis added).

The Examiner relies on Mirshafiee, et al. for disclosing a turn button 140, and concedes that the shaft of turn button 140 does not include a leading helical end. However, the Examiner asserts that element 75 of Dietrich, et al. discloses a leading helical end, and concludes it would be obvious to one of ordinary skill in the art at the time of the invention to utilize a conical leading end, as taught by Dietrich, et al., on the shaft of Mirshafiee in order to ease in the insertion of the shaft into the aperture.

Upon review of Dietrich, et al. it is immediately apparent that Dietrich, et al. discloses a spindle 37 having a conical end (Dietrich, et al. Fig. 1). More particularly, the inside end of the spindle 37 is provided with a conical end which results in an oblique face 75 serving as a cam follower. (Dietrich, et al. at column 4, lines 4-8, and Fig. 1).

Appellant maintains that the conical end of spindle 37 of Dietrich, et al. does not disclose, teach or suggest a helical end portion, as recited in Appellant's claims.

To account for this clear deficiency in the disclosure of Dietrich, et al. with respect to the present invention, however, the Examiner states at page 4 of the Office Action of November 15, 2007, that "Merriam-Webster's Online Dictionary defines helix as 'a curve traced on a cylinder or cone by the rotation of a point crossing its right sections at a constant oblique angle.' Thus a helical end surface can be a conical surface, as both end surfaces follow a path rotated about a central surface." One problem with the Examiner's rationale here is that the helix is a shape which is defined in terms of a traced curve following the contour of a cylindrical or cone, but the "helix" as a shape is not the surface of the cylinder or the cone. In other words, a curve formed on a conical surface may form a helix shape, but it does not convert the conical surface of the cone to a helical surface.

A common device that would have a helical surface is a coil spring, but one of ordinary skill in the art would not confuse, or correlate, the spiraling shape of a coil spring helical surface to a conical surface. Thus, relating again to claim 1, which recites in part, "said shaft having a leading helical end portion that engages said aperture of said lock mechanism", one skilled in the art would not be lead to arrive at the spiraling shape of a helical end portion of the turn-button of the present invention by the disclosure of a conical end portion of spindle 37 of Dietrich, et al.

Appellant respectfully submits that a conical end (a cone) is not analogous to a helical end. Merriam-Webster's Online Dictionary defines a cone as "a solid generated by rotating a right triangle about one of its legs." Thus, a conical end has a single continuous outer surface, as is clearly illustrated in Dietrich, et al. Figs. 1 and 5. In contrast, a shaft

having a helical end portion is an end portion which itself has a helix shape, i.e., an end portion that spirals to some degree. Thus, contrary to the Examiner's assertion, the conical shape as disclosed in Dietrich, et al. is not a helical form, and the Examiner's conclusion that a helical end surface can be a conical surface simply does not follow.

Accordingly, even if Mirshafiee, et al. in view of Dietrich, et al. were combined, their combination would not yield the structure of the present invention or render it obvious. Nowhere in the combination of Mirshafiee, et al. and Dietrich, et al. is there any disclosure, teaching or suggestion of the subject matter of claim 1, and in particular, there is no disclosure, teaching or suggestion to form a turn-button including a shaft extending from a head portion, the shaft having a leading helical end portion that engages the aperture of the lock mechanism, as recited in claim 1.

Further, for reasons set forth above, the improved structure provided by the present invention over that of Mirshafiee, et al. in view of Dietrich, et al. is more than the predictable use of the elements of Mirshafiee, et al. in view of Dietrich, et al. according to their established functions. See *KSR International Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 82 USPQ2d 1385, 1396 (2007).

For at least the reasons set forth above, Mirshafiee, et al. in view of Dietrich, et al. do not render obvious the subject matter of claim 1 under 35 U.S.C. §103(a). Thus, Appellant submits that claim 1 is patentable in its present form.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 1 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

4. CLAIM 2 IS PATENTABLE

Claim 2 is dependent directly from claim 1, and thus is patentable in view of its respective dependence from allowable base claim 1.

In addition, claim 2 is patentable in its own right.

Claim 2 recites, "The lockset of claim 1, said leading helical end portion having a plurality of leading helical surfaces *that taper and twist* from a transition line of said shaft toward a tip end of said shaft." The Examiner asserts at pages 2 and 3 of the Office Action of November 15, 2007, that conical end 75 of Dietrich, et al. discloses a plurality of leading helical surfaces that taper and twist. The Examiner further asserts at page 4 of the Office Action of November 15, 2007, that Dietrich, et al. discloses "four continuous surfaces at mid point of the shaft that taper and twist to form the conical end portion." However, in Dietrich, et al. spindle 37 provided with a conical end is a shaft with a non-circular (e.g., square) cross-section having a conical end, similar to a sharpened wooden pencil. Clearly, the conical end 75 of Dietrich, et al. has only a single continuous outer surface that smoothly tapers to a point without any twisting. (See Dietrich, et al. Figs. 1 and 5).

Thus, even if the turn button of Mirshafiee, et al. were modified to include the conical end as disclosed in Dietrich, et al., the result would not yield the structure of the turn-button, as recited in Appellant's claim 2.

For at least the reasons set forth above, Mirshafiee, et al. in view of Dietrich, et al. do not render obvious the subject matter of claim 2 under 35 U.S.C. §103(a). Thus, Appellant submits that claim 2 is patentable in its present form.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 2 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

5. CLAIM 3 IS PATENTABLE

Claim 3 is dependent directly from claim 2, which in turn depends from claim 1, and thus is patentable in view of its respective dependence from allowable base claim 1 and/or intervening claim 2.

In addition, claim 3 is patentable in its own right.

Claim 3 recites, "The lockset of claim 2, wherein said plurality of leading helical surfaces smoothly transition between adjacent helical surfaces." The Examiner asserts at page 3 of the Office Action of November 15, 2007, that conical end 75 of Dietrich, et al. (Fig. 5) discloses a plurality of leading helical surfaces that smoothly transition between adjacent helical surfaces. The Examiner further asserts at page 4 of the Office Action of November 15, 2007, that in Fig. 5 of Dietrich, et al., "it is clear that there are no sharp edges or abrupt stops to prevent a smooth transition."

To the contrary, as shown in Dietrich, et al. Fig. 5 the square spindle abruptly changes at the scalloped edge so formed (which is clearly shown) from the flat sides of the shaft to the conical end that has a single continuous outer surface that smoothly tapers to a point, and also abruptly changes from one flat side surface to the next adjacent flat side surface around the spindle. Thus, in Dietrich, et al. Fig. 5 the four surfaces of the rectangular portion of the spindle are not formed as helical surfaces, the conical end 75 does not define a plurality of helical surfaces, and Dietrich, et al. does not disclose, teach

of suggest a plurality of leading helical surfaces that smoothly transition between adjacent helical surfaces.

Thus, even if the turn button of Mirshafiee, et al. were modified to include the conical end as disclosed in Dietrich, et al., the result would not yield the structure of the turn-button, as recited in Appellant's claim 3.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 3 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

6. CLAIM 4 IS PATENTABLE

Claim 4 recites, "A turn-button for a lockset, comprising: a head portion; and a shaft extending from said head portion, said shaft having a leading helical end tip." Claim 4 differs in scope from claim 1, for example, through the recitation of a "leading helical end tip".

In rejecting claim 4, the Examiner again relies on Mirshafiee, et al. for disclosing a turn button 140, and concedes that the shaft of turn button 140 does not include a leading helical end portion. However, the Examiner asserts that element 75 of Dietrich, et al. discloses a leading helical end, and concludes it would be obvious to one of ordinary skill in the art at the time of the invention to utilize a conical leading end, as taught by Dietrich, et al., on the shaft of Mirshafiee in order to ease the insertion of the shaft into the aperture.

For reasons more fully set forth above with respect to claim 1, Appellant respectfully submits that a conical end (a cone) is not analogous to a helical end tip, as recited in claim 4. A conical end tip 75 as disclosed Dietrich, et al. has a single continuous outer surface, rather than having a leading helical end tip, i.e., an end tip in the form of a

helix, i.e., an end tip that spirals to some degree. Thus, contrary to the Examiner's assertion, the conical shape of the tip of conical end 75 as disclosed in Dietrich, et al. is not a helical form.

Thus, even if the turn button of Mirshafiee, et al. were modified to include the conical end as disclosed in Dietrich, et al., the result would not yield the structure of the turn-button, as recited in Appellant's claim 4.

Accordingly, for at least the reasons set forth above, Mirshafiee, et al. in view of Dietrich, et al. do not render obvious the subject matter of claim 4 under 35 U.S.C. §103(a). Thus, Appellant submits that claim 4 is patentable in its present form.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 4 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

7. CLAIM 5 IS PATENTABLE

Claim 5 is dependent directly from claim 4, and thus is patentable in view of its respective dependence from allowable base claim 4.

In addition, claim 5 is patentable in its own right.

Claim 5 recites, "The turn-button of claim 4, said leading helical end tip having a plurality of leading helical surfaces that taper and twist from a transition line of said shaft toward a tip end of said shaft." The Examiner asserts at pages 2 and 3 of the Office Action of November 15, 2007, that conical end 75 of Dietrich, et al. discloses a plurality of leading helical surfaces that taper and twist. The Examiner further asserts at page 4 of the Office Action of November 15, 2007, that Dietrich, et al. discloses "four continuous surfaces at mid point of the shaft that taper and twist to form the conical end portion."

However, in Dietrich, et al. spindle 37 provided with a conical end is a shaft with a non-circular (e.g., square) cross-section having a conical end, similar to a sharpened wooden pencil. Clearly, the conical end 75 of Dietrich, et al. has only a single continuous outer surface that smoothly tapers to a point without any twisting. (See Dietrich, et al. Figs. 1 and 5).

Thus, even if the turn button of Mirshafiee, et al. were modified to include the conical end as disclosed in Dietrich, et al., the result would not yield the structure of the turn-button, as recited in Appellant's claim 5.

For at least the reasons set forth above, Mirshafiee, et al. in view of Dietrich, et al. do not render obvious the subject matter of claim 5 under 35 U.S.C. §103(a). Thus, Appellant submits that claim 5 is patentable in its present form.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 5 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

8. CLAIM 6 IS PATENTABLE

Claim 6 is dependent directly from claim 5, which in turn depends from claim 4, and thus is patentable in view of its respective dependence from allowable base claim 4 and/or intervening claim 5.

In addition, claim 6 is patentable in its own right.

Claim 6 recites, "The turn-button of claim 5, wherein said plurality of leading helical surfaces smoothly transition between adjacent helical surfaces." The Examiner asserts at page 3 of the Office Action of November 15, 2007, that conical end 75 of Dietrich, et al. (Fig. 5) discloses a plurality of leading helical surfaces that smoothly

transition between adjacent helical surfaces. The Examiner further asserts at page 4 of the Office Action of November 15, 2007, that in Fig. 5 of Dietrich, et al., "it is clear that there are no sharp edges or abrupt stops to prevent a smooth transition."

However, as shown in Dietrich, et al. Fig. 5 the square spindle abruptly changes at the scalloped edge so formed (which is clearly shown) from the flat sides of the shaft to the conical end that has a single continuous outer surface that smoothly tapers to a point, and also abruptly changes from one flat side surface to the next adjacent flat side surface around the spindle. Thus, in Dietrich, et al. Fig. 5 the four surfaces of the rectangular portion of the spindle are not formed as helical surfaces, the conical end 75 does not define a plurality of helical surfaces, and Dietrich, et al. does not disclose, teach or suggest a plurality of leading helical surfaces that smoothly transition between adjacent helical surfaces.

Thus, even if the turn button of Mirshafiee, et al. were modified to include the conical end as disclosed in Dietrich, et al., the result would not yield the structure of the turn-button, as recited in Appellant's claim 6.

For at least the reasons set forth above, Mirshafiee, et al. in view of Dietrich, et al. do not render obvious the subject matter of claim 6 under 35 U.S.C. §103(a). Thus, Appellant submits that claim 6 is patentable in its present form.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 6 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

9. CLAIM 8 IS PATENTABLE

Claim 8 is dependent directly from claim 1, and thus is patentable in view of its respective dependence from allowable base claim 1.

In addition, claim 8 is patentable in its own right.

Claim 8 recites, "The lockset of claim 1, said lock mechanism including a rotatable actuator having said aperture, wherein once said leading helical end portion engages said aperture, a rotation of said turn-button effects a corresponding rotation of said rotatable actuator of said lock mechanism."

The Examiner relies on Mirshafiee, et al. for disclosing a turn button 140, and concedes that the shaft of turn button 140 does not include a leading helical end. However, the Examiner asserts that Dietrich, et al. discloses the specific subject matter of claim 8 at column 3, lines 44-66. The Examiner further asserts at page 4 of the Office action of November 15, 2007, that claim 8 "is absent that the helical end portion is the mechanism that rotates the rotatable actuator."

Notwithstanding, the cited passage from Dietrich, et al. relied on by the Examiner does not discuss conical end 75, which the Examiner asserts as being analogous to the leading helical end portion recited in claims 1 and 8. Further, Dietrich, et al. discloses in column 4, lines 5-14, that the conical end 75 of spindle 37 (which moves linearly during operation) serves as a cam follower that engages the reduced end portion 71 of the locking slide 60, and thus does not engage an aperture of a rotatable actuator, as recited in claim 8.

Thus, the improved structure provided by the present invention over that of Mirshafiee, et al. in view of Dietrich, et al. is more than the predictable use of the elements

of Mirshafiee, et al. in view of Dietrich, et al. according to their established functions. See *KSR International Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 82 USPQ2d 1385, 1396 (2007).

For at least the reasons set forth above, Mirshafiee, et al. in view of Dietrich, et al. do not render obvious the subject matter of claim 8 under 35 U.S.C. §103(a). Thus, Appellant submits that claim 8 is patentable in its present form.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 8 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

10. CLAIM 9 IS PATENTABLE

Claim 9 recites, in part, "means for facilitating self-alignment of said shaft of said turn-button with said aperture of said lock mechanism as said shaft of said turn-button is inserted into said aperture of said lock mechanism, said means including a plurality of leading helical surfaces that taper and twist from a transition line of said shaft toward a tip end of said shaft."

The Examiner relies on Mirshafiee, et al. for disclosing a turn button 140, and concedes that the shaft of turn button 140 does not include a leading helical end. However, the Examiner asserts that element 75 of Dietrich, et al. discloses a leading helical end, and concludes it would be obvious to one of ordinary skill in the art at the time of the invention to utilize a conical leading end, as taught by Dietrich, et al., on the shaft of Mirshafiee in order to ease the insertion of the shaft into the aperture.

Upon review of Dietrich, et al., it is immediately apparent that Dietrich, et al. discloses a spindle 37 having a conical end (Dietrich, et al. Fig. 1). More particularly, the inside end of the spindle 37 is provided with a conical end which results in an oblique face

75 serving as a cam follower. (Dietrich, et al. at column 4, lines 4-8, and Fig. 1). Appellant maintains that the conical end of spindle 37 of Dietrich, et al. does not disclose, teach or suggest a plurality of leading helical surfaces, as recited in Appellant's claim 9.

To account for this clear deficiency in the disclosure of Dietrich, et al. with respect to the present invention, however, the Examiner states at page 4 of the Office Action of November 15, 2007, that "Merriam-Webster's Online Dictionary defines helix as 'a curve traced on a cylinder or cone by the rotation of a point crossing its right sections at a constant oblique angle.' Thus a helical end surface can be a conical surface, as both end surfaces follow a path rotated about a central surface." One problem with the Examiner's rationale here is that the helix is a shape which is defined in terms of a traced curve following the contour of a cylindrical or cone, but the "helix" is not the surface of the cylinder or the cone. In other words, a curve formed on a conical surface may form a helix shape, but it does not convert the conical surface of the cone to a helical surface, let alone to a plurality of leading helical surfaces, as recited in claim 9.

A common device that would have a single helical surface is a coil spring, but one of ordinary skill in the art would not confuse, or correlate, the spiraling shape of a coil spring helical surface to a conical surface. Thus, relating again to claim 9, which recites in part, "said means including a plurality of leading helical surfaces that taper and twist from a transition line of said shaft toward a tip end of said shaft", one skilled in the art would not be lead to arrive at the spiraling shape of a plurality of leading helical surfaces of the turn-button of the present invention by the disclosure of a conical end portion of spindle 37 of Dietrich, et al.

Appellant respectfully submits that a conical end (a cone) is not analogous to a plurality of leading helical surfaces. Merriam-Webster's Online Dictionary defines a cone as "a solid generated by rotating a right triangle about one of its legs." Thus, a conical end has a single continuous outer surface, as is clearly illustrated in Dietrich, et al. Figs. 1 and 5. In contrast, a shaft having a plurality of leading helical surfaces is an end portion which itself has a helix shape, i.e., an end portion having a plurality of surfaces that spiral to some degree. Thus, contrary to the Examiner's assertion, the conical shape as disclosed in Dietrich, et al. is not a helical form, and the Examiner's conclusion that a helical end surface can be a conical surface simply does not follow.

The Examiner further asserts at pages 2 and 3 of the Office Action of November 15, 2007, that conical end 75 of Dietrich, et al. discloses a plurality of leading helical surfaces that taper and twist. The Examiner further asserts at page 4 of the Office Action of November 15, 2007, that Dietrich, et al. discloses "four continuous surfaces at mid point of the shaft that taper and twist to form the conical end portion." However, in Dietrich, et al. spindle 37 provided with a conical end is a shaft with a non-circular (e.g., square) cross-section having a conical end, similar to a sharpened wooden pencil. Clearly, the conical end 75 of Dietrich, et al. has only a single continuous outer surface that smoothly tapers to a point without any twisting. (See Dietrich, et al. Figs. 1 and 5).

Thus, even if the turn button of Mirshafiee, et al. were modified to include the conical end as disclosed in Dietrich, et al., the result would not yield the structure of the turn-button, as recited in Appellant's claim 9.

Further, for reasons set forth above, the improved structure provided by the present invention over that of Mirshafiee, et al. in view of Dietrich, et al. is more than the

predictable use of the elements of Mirshafiee, et al. in view of Dietrich, et al. according to their established functions. See *KSR International Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 82 USPQ2d 1385, 1396 (2007).

For at least the reasons set forth above, Mirshafiee, et al. in view of Dietrich, et al. do not render obvious the subject matter of claim 9 under 35 U.S.C. §103(a). Thus, Appellant submits that claim 9 is patentable in its present form.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 9 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

11. CLAIM 10 IS PATENTABLE

Claim 10 is dependent directly from claim 9, and thus is patentable in view of its respective dependence from allowable base claim 9.

In addition, claim 10 is patentable in its own right.

Claim 10 recites, "The lockset of claim 9, wherein said plurality of leading helical surfaces smoothly transition between adjacent helical surfaces." The Examiner asserts at page 3 of the Office Action of November 15, 2007, that conical end 75 of Dietrich, et al. (Fig. 5) discloses a plurality of leading helical surfaces that smoothly transition between adjacent helical surfaces. The Examiner further asserts at page 4 of the Office Action of November 15, 2007, that in Fig. 5 of Dietrich, et al., "it is clear there are no sharp edges or abrupt stops to prevent a smooth transition."

To the contrary, as shown in Dietrich, et al. Fig. 5 the square spindle abruptly changes at the scalloped edge so formed (which is clearly shown) from the flat sides of the shaft to the conical end that has a single continuous outer surface that smoothly tapers to a

point, and also abruptly changes from one flat side surface to the next adjacent flat side surface around the spindle. Thus, in Dietrich, et al. Fig. 5 the four surfaces of the rectangular portion of the shaft are not formed as helical surfaces, the conical end 75 does not define a plurality of helical surfaces, and Dietrich, et al. does not disclose, teach of suggest a plurality of leading helical surfaces that smoothly transition between adjacent helical surfaces.

Thus, even if the turn button of Mirshafiee, et al. were modified to include the conical end as disclosed in Dietrich, et al., the result would not yield the structure as recited in Appellant's claim 10.

For at least the reasons set forth above, Mirshafiee, et al. in view of Dietrich, et al. do not render obvious the subject matter of claim 10 under 35 U.S.C. §103(a). Thus, Appellant submits that claim 10 is patentable in its present form.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 10 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

12. CLAIMS 11-13 ARE PATENTABLE

Each of claims 11-13 is dependent directly from claim 1, and thus is patentable in view of its respective dependence from allowable base claim 1.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claims 11-13 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

13. CLAIM 14 IS PATENTABLE

Claim 14 is dependent directly from claim 2, which in turn depends from claim 1, and thus is patentable in view of its respective dependence from allowable base claim 1 and/or intervening claim 2.

In addition, claim 14 is patentable in its own right.

Claim 14 recites, "The lockset of claim 2, wherein a number of said plurality of leading helical surfaces is greater than two." In other words, the number of the plurality of leading helical surfaces is three or more. In contrast, the conical end 75 of Dietrich, et al. clearly has only a single continuous outer surface. (See Dietrich, et al. Figs. 1 and 5).

Thus, even if the turn button of Mirshafiee, et al. were modified to include the conical end as disclosed in Dietrich, et al., the result would not yield the structure of the turn-button, as recited in Appellant's claim 14.

For at least the reasons set forth above, Mirshafiee, et al. in view of Dietrich, et al. do not render obvious the subject matter of claim 14 under 35 U.S.C. §103(a). Thus, Appellant submits that claim 14 is patentable in its present form.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 14 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

14. CLAIM 15 IS PATENTABLE

Claim 15 is dependent directly from claim 4, and thus is patentable in view of its respective dependence from allowable base claim 4.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 15 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

15. CLAIM 16 IS PATENTABLE

Claim 16 is dependent directly from claim 5, which in turn depends from claim 4, and thus is patentable in view of its respective dependence from allowable base claim 4 and/or intervening claim 5.

In addition, claim 16 is patentable in its own right.

Claim 16 recites, "The turn-piece of claim 5, wherein a number of said plurality of leading helical surfaces is greater than two." In other words, the number of the plurality of leading helical surfaces is three or more. In contrast, the conical end 75 of Dietrich, et al. clearly has only a single continuous outer surface. (See Dietrich, et al. Figs. 1 and 5).

Thus, even if the turn button of Mirshafiee, et al. were modified to include the conical end as disclosed in Dietrich, et al., the result would not yield the structure of the turn-button, as recited in Appellant's claim 16.

For at least the reasons set forth above, Mirshafiee, et al. in view of Dietrich, et al. do not render obvious the subject matter of claim 16 under 35 U.S.C. §103(a). Thus, Appellant submits that claim 16 is patentable in its present form.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 16 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

16. CLAIMS 17 AND 18 ARE PATENTABLE

Each of claims 17 and 18 is dependent directly from claim 9, and thus is patentable in view of its respective dependence from allowable base claim 9.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claims 17 and 18 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

17. CLAIM 19 IS PATENTABLE

Claim 19 is dependent directly from claim 9, and thus is patentable in view of its respective dependence from allowable base claim 9.

In addition, claim 19 is patentable in its own right.

Claim 19 recites, "The lockset of claim 9, wherein a number of said plurality of leading helical surfaces is greater than two." In other words, the number of the plurality of leading helical surfaces is three or more. In contrast, the conical end 75 of Dietrich, et al. clearly has only a single continuous outer surface. (See Dietrich, et al. Figs. 1 and 5).

Thus, even if the turn button of Mirshafiee, et al. were modified to include the conical end as disclosed in Dietrich, et al., the result would not yield the structure as recited in Appellant's claim 19.

For at least the reasons set forth above, Mirshafiee, et al. in view of Dietrich, et al. do not render obvious the subject matter of claim 19 under 35 U.S.C. §103(a). Thus, Appellant submits that claim 19 is patentable in its present form.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 19 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

18. CLAIM 20 IS PATENTABLE

Claim 20 is dependent directly from claim 1, and thus is patentable in view of its respective dependence from allowable base claim 1.

In addition, claim 20 is patentable in its own right.

Claim 20 recites, "The lockset of claim 1, wherein said leading helical end portion forms a plurality of side surfaces of said shaft." (Emphasis added). In contrast, the conical end 75 of Dietrich, et al. clearly has only a single continuous outer side surface. (See Dietrich, et al. Figs. 1 and 5).

Thus, even if the turn button of Mirshafiee, et al. were modified to include the conical end as disclosed in Dietrich, et al., the result would not yield the structure of the turn-button, as recited in Appellant's claim 20.

For at least the reasons set forth above, Mirshafiee, et al. in view of Dietrich, et al. do not render obvious the subject matter of claim 20 under 35 U.S.C. §103(a). Thus, Appellant submits that claim 20 is patentable in its present form.

Accordingly, Appellant respectfully requests that the Board reverse the rejection of claim 20 under 35 U.S.C. §103(a) as being unpatentable over Mirshafiee, et al. in view of Dietrich, et al.

B. CONCLUSION

For the foregoing reasons, Appellant submits that claims 1-6 and 8-20 are patentable in their present respective forms. Accordingly, Appellant respectfully requests that the Board reverse the final rejections of claims 1-6 and 8-20.

Respectfully submitted,

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Attorney for Appellant

RKA/ts

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IX. CLAIMS APPENDIX

1. A lockset, comprising:

a lock mechanism having an aperture;

an operator; and

a turn-button mounted in said operator, said turn-button including:

a head portion; and

a shaft extending from said head portion, said shaft having a leading helical end portion that engages said aperture of said lock mechanism.

2. The lockset of claim 1, said leading helical end portion having a plurality of leading helical surfaces that taper and twist from a transition line of said shaft toward a tip end of said shaft.

3. The lockset of claim 2, wherein said plurality of leading helical surfaces smoothly transition between adjacent helical surfaces.

4. A turn-button for a lockset, comprising:

a head portion; and

a shaft extending from said head portion, said shaft having a leading helical end tip.

5. The turn-button of claim 4, said leading helical end tip having a plurality of leading helical surfaces that taper and twist from a transition line of said shaft toward a tip end of said shaft.

6. The turn-button of claim 5, wherein said plurality of leading helical surfaces smoothly transition between adjacent helical surfaces.

7. (Canceled)

8. The lockset of claim 1, said lock mechanism including a rotatable actuator having said aperture, wherein once said leading helical end portion engages said aperture, a rotation of said turn-button effects a corresponding rotation of said rotatable actuator of said lock mechanism.

9. A lockset comprising:

a lock mechanism including an actuator having an aperture;

an operator;

a turn-button mounted in said operator, said turn-button including a shaft; and

means for facilitating self-alignment of said shaft of said turn-button with said aperture of said lock mechanism as said shaft of said turn-button is inserted into said aperture of said lock mechanism, said means including a plurality of leading helical surfaces that taper and twist from a transition line of said shaft toward a tip end of said shaft.

10. The lockset of claim 9, wherein said plurality of leading helical surfaces smoothly transition between adjacent helical surfaces.

11. The lockset of claim 1, wherein said operator is one of a door knob and a door lever, said shaft of said turn-button extending from said head portion through said one of said door knob and said door lever to engage said aperture of said lock mechanism.

12. The lockset of claim 1, wherein a rotation of said turn-button effects a corresponding rotation of said aperture of said lock mechanism.

13. The lockset of claim 1, wherein said aperture of said lock mechanism has a substantially rectangular shape.

14. The lockset of claim 2, wherein a number of said plurality of leading helical surfaces is greater than two.

15. The turn-button of claim 4, wherein a perimeter of an elongate portion of said shaft has a substantially rectangular shape.

16. The turn-button of claim 5, wherein a number of said plurality of leading helical surfaces is greater than two.

17. The lockset of claim 9, wherein said operator is one of a door knob and a door lever, said shaft of said turn-button extending through said one of said door knob and said door lever to engage said aperture of said lock mechanism.

18. The lockset of claim 9, wherein said aperture of said lock mechanism has a substantially rectangular shape.

19. The lockset of claim 9, wherein a number of said plurality of leading helical surfaces is greater than two.

20. The lockset of claim 1, wherein said leading helical end portion forms a plurality of side surfaces of said shaft.

X. EVIDENCE APPENDIX

Included herein, and listed below, is a copy of each reference upon which the Examiner relied in rejecting one or more of the claims of the present application.

Exhibit:

A. U.S. Patent No. 5,335,950 (Mirshafiee, et al.)

B. U.S. Patent No. 4,108,482 (Dietrich, et al.)

XI. RELATED PROCEEDINGS APPENDIX

(No Entries)

US005335950A

United States Patent [19]

Mirshafiee et al.

[11] Patent Number: 5,335,950

[45] Date of Patent: Aug. 9, 1994

Exhibit A

[54] **DOOR LOCKSET WITH SPINDLE BEARING**

[75] Inventors: **David Mirshafiee**, Fountain Valley; **Gary R. Bergen**, Yorba Linda, both of Calif.

[73] Assignee: **Emhart Inc.**, Newark, Del.

[21] Appl. No.: **928,585**

[22] Filed: **Aug. 13, 1992**

[51] **Int. Cl.**[5] **E05B 15/02**

[52] **U.S. Cl.** **292/356**; 292/169.23

[58] **Field of Search** 292/169, 169.23, 169.14, 292/356, 357, 347, 359

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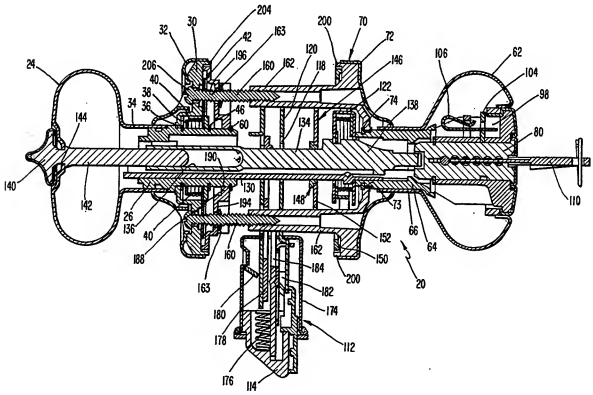
Primary Examiner—Rodney M. Lindsey
Attorney, Agent, or Firm—J. Bruce Hoofnagle

[57] **ABSTRACT**

A lockset **20** includes an interior knob **24** mounted on an insert **26** and an exterior knob **62** mounted on an insert **64**. A rose liner **30** and a cover **58** are mounted on the insert and provide a spaced bearing support for an interior assembly including knob **24**. A rose liner **70** is mounted on insert **64** and combines with a security shield **146** and bearing **148** to provide a spaced bearing support for an exterior assembly including knob **62**. Knob **62** is assembled with insert **64** through dimples **164** and projections **168** to allow slippage of the knob on the insert upon the application of excessive force without destruction of elements of lockset **20**.

20 Claims, 5 Drawing Sheets



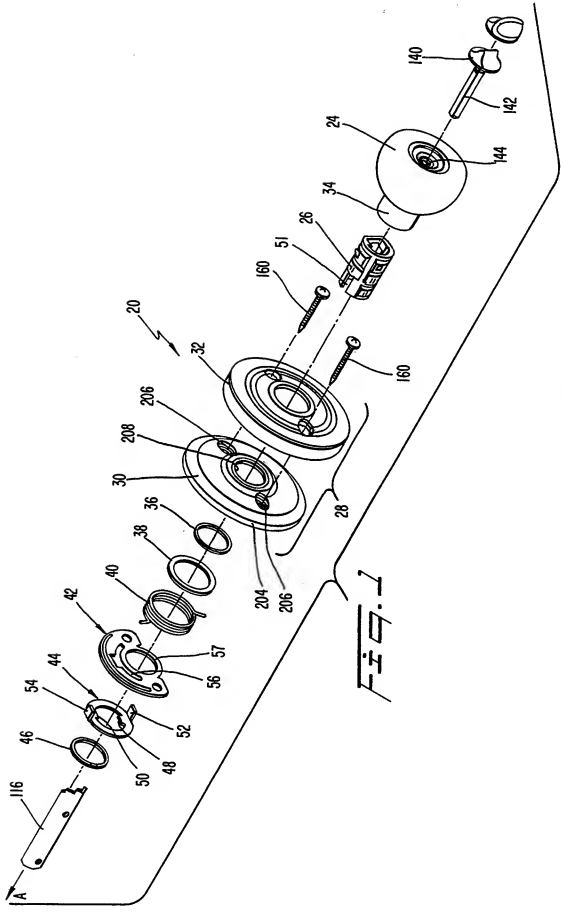

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Fig. 1

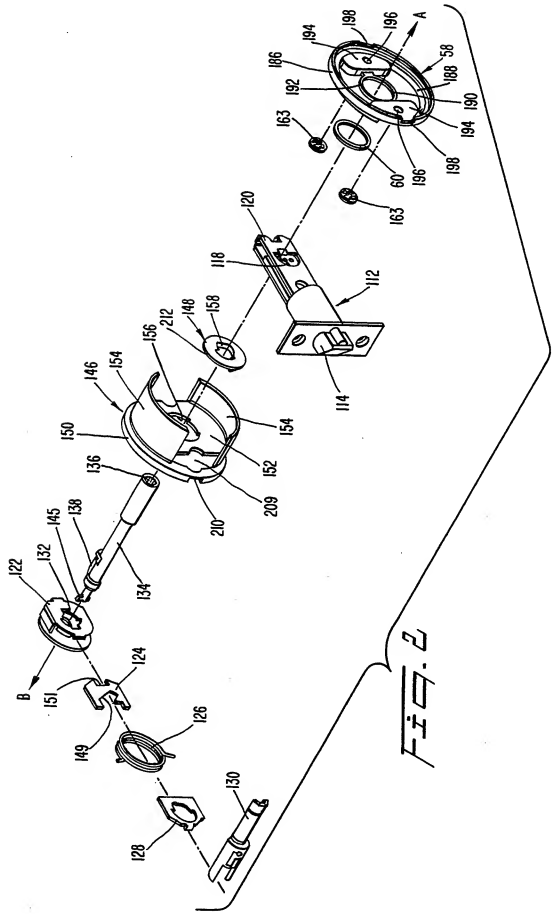
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Fig. 2

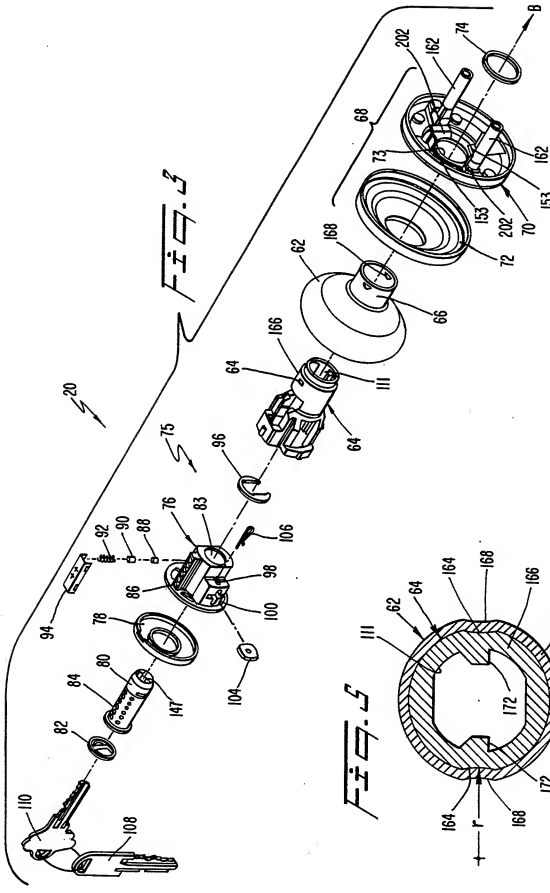
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FIG. 3
FIG. 4
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r

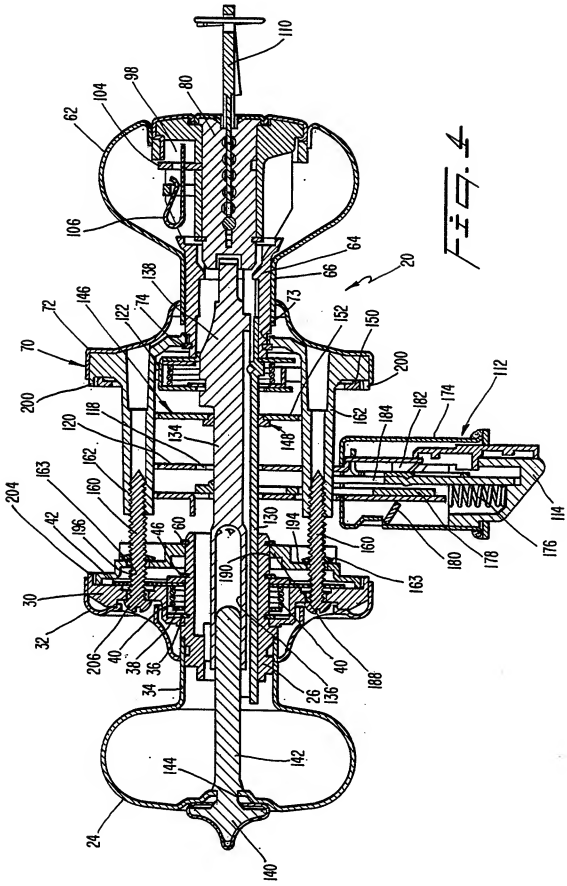
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FIG. 4

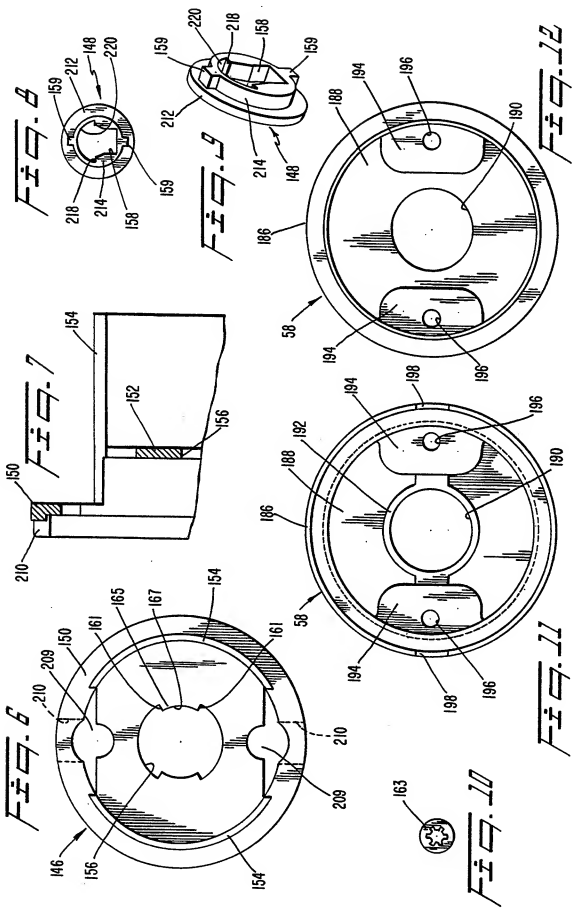
FIG. 8
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FIG. 9
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FIG. 6
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FIG. 10
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DOOR LOCKSET WITH SPINDLE BEARING

BACKGROUND OF THE INVENTION

This invention relates to a door lockset with a spindle bearing and particularly relates to a door lockset with structure for enhancing bearing support for various components of the lockset.

In some currently available locksets which are designed for assembly with doors, some of the structural components within the lockset, while adequately supported, are not supported in a sturdy manner. This results in sagging and/or wobble of the door operator or knob relative to the door and also places significant stresses on those bearing surfaces which are included within such locksets. This could result in significant wear of the existing bearing surfaces and adjacent elements and potential early demise of the lockset.

Typically, a door is prepared with a through hole for subsequent receipt of interior portions of the lockset. Fastening screws are used to retain the interior portions of the lockset within the hole as well as to retain, with the door, those portions of the lockset on opposite exterior portions of the door. If the screws are not tightened firmly, or if the screws loosen later, the lockset tends to slip downwardly and thereby sag. This could result in exposure of a portion of the hole in the door which becomes unsightly. Even worse, the exposed hole would allow someone without authority to place an implement into the hole and operate the latch mechanism or directly manipulate the bolt. Certainly, the unsightly appearance of the hole and the opportunity for unauthorized access to the interior of the lockset is unacceptable.

Still further, some currently available door knobs include a sleeve which is staked to a mating sleeve of a knob insert. If forced entry is attempted by twisting the knob beyond the ability of the staked elements, certain elements could be destroyed and thereby require costly replacement thereof.

In light of the above-noted limitations, there is a need for a door lockset which provides for sturdy support of the elements of the lockset, lessens the opportunity for unauthorized entry by invasion of the operating mechanism and further provides for a nondestructive response to attempted unauthorized entry when the knob is forced beyond its normal operating limits.

SUMMARY OF THE INVENTION

In light of the needs expressed above, it is an object of this invention to provide a door lockset having interior bearing structure for supporting the elements thereof in a sturdy manner.

Another object of this invention is to provide a door lockset which reduces the opportunity for unauthorized entry through invasion of the lockset operating mechanism.

Still another object of this invention is to provide a door lockset which allows for a nondestructive reaction to elements of the lockset when forced entry is attempted by twisting the knob of the lockset beyond its normal operating limits.

With these and other objects in mind, this invention contemplates a door lockset designed for assembly with a door and including a latch bolt and a bolt operating mechanism coupled to the bolt. An operator is coupled to the bolt operating mechanism and movable for actuating the bolt operating mechanism to move the bolt. A support is attached to the operator for movement therewith. A first bearing member is formed with a first bearing surface which is positioned adjacent the support. A bearing support surface is spaced from the first bearing member. A second bearing member is formed with a second bearing surface which is spaced from the first bearing surface and the support and which is positioned adjacent the bearing support surface. Fastening elements are provided for retaining the first bearing member and the second bearing member in assembly with the door and in spaced position relative to each other to provide spaced bearing support for the door lockset.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIGS. **1**, **2** and **3** are exploded views which, when combined, illustrate elements of a lockset embodying certain principles of the invention;

FIG. **4** is an assembly view of the lockset of FIG. **1** showing features embodying certain principles of the invention;

FIG. **5** is a sectional view showing the assembly of a knob sleeve with an insert of the lockset of FIG. **1** embodying certain principle of the invention;

FIGS. **6** and **7** are views showing a security shield embodying certain principles of the invention;

FIG. **8** and **9** are views showing a bearing embodying certain principle of the invention;

FIG. **10** is a front view of a screw retainer; and

FIGS. **11** and **12** are views showing a cover embodying certain principles of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

FIGS. **1**, **2** and **3** illustrate collectively an exploded view of a door lockset **20**. To illustrate the complete exploded view of lockset **20**, FIGS. **1** and **2** are to be linked at centerline arrowheads "A" and FIGS. **2** and **3** are to be linked at centerline arrowheads "B."

As shown in FIGS. **1** and **4**, an interior knob **24** receives a knob insert **26** to facilitate assembly of other elements therewith. A rose assembly **28** consists of a liner **30** and a cover **32**. Cover **32** is positioned over insert **26** and a shank **34** of knob **24** while liner **30** is positioned over the insert and is held in position by a retaining ring **36** located on the insert. A spacer washer **38** and a torque spring **40** are positioned on insert **26**. A stop plate **42** and a torque spring housing **44** are positioned on insert **26** and held there by a retaining ring **46**.

A pair of radially inward tabs **48** and **50** of housing **44** fit into accommodating slots **51** (one shown) of insert **26** so that the housing rotates when knob **24** and the insert are rotated. A pair of tabs **52** and **54** project from a side face of housing **44** and extend respectively through an arcuate slot **56** and an arcuate edge **57** of stop plate **42**. A cover **58** (FIG. **2**) is then positioned onto insert **26** and is held there by retaining ring **60** (FIG. **2**).

As knob **24** is rotated, insert **26** and housing **44** are rotated whereby tabs **52** and **54** compress spring **40**. Tabs **52** and **54** also engage the ends of the arcuate slot **56** and edge **57** to limit the rotational travel of knob **24**.

As shown in FIG. **3**, an exterior knob **62** is designed to receive a knob insert **64** through an opening in the front of the knob and extends partially through an inward end of a shank **66** of the knob. A rose assembly **68**, consisting of a liner **70** and a cover **72**, is positioned on

the inward, extended end of insert **64** so that an opening **73** of the liner is positioned on the insert and the rose assembly is held there by a retaining ring **74**.

Also shown in FIG. **3** is a lock cylinder assembly **75** which includes a cylinder body **76**, a cylinder cover **78**, a plug **80** and a plug cover **82**. Plug **80** is inserted into a cylindrical opening **83** of cylinder body **76** so that tumbler pin holes **84** of the plug align with tumbler pin holes **86** of the body. A bottom pin **88**, a top pin **90** and a spring **92** are positioned within each of the aligned holes **84** and **86**. A cover **94** is positioned over the top of the holes **86** of the body. A clip **96** is placed over the inward end of plug **80** to retain the plug with body **76**.

Cylinder body **76** is formed with a lateral housing **98**. Housing **98** is formed with a slot **100** which communicates with central opening **83** formed axially through body **76**. A locking bar **104** is located within slot **100** and is biased by a hair-pin spring **106** toward opening **83**. A slot (not shown) is formed in a portion of the peripheral wall of plug **80** and is positionable with bar **104**, and with the use of a slotted removal key **108**, to assemble and disassemble cylinder assembly **75** with insert **64** and knob **62**. A regular pass key **110**, without a slot in the blade, is used in the conventional manner to turn plug **80** within cylinder body **76**.

Cylinder assembly **75** is assembled within a through opening **111** of insert **64** at the outboard end thereof and thereby within the outboard end of knob **62**.

As shown in FIG. **2**, a door latch assembly **112**, including a bolt **114**, is positioned to receive a first half-round spindle **116** (FIG. **1**) through an opening **118** in a rear frame **120** of the assembly. Spindle **116** is coupled to and driven by knob **24** and the drive elements illustrated in FIG. **1**. A lock housing **122** is in axial alignment with the previously described elements of lockset **20** and provides an enclosure for a locking slide **124**, a detent spring **126** and a detent slide **128**. A second half-round spindle **130** extends through an opening **132** in housing **122** and is coupled to knob **62** for control of rotation of the spindle. Spindle **130** also extends into opening **118** of latch assembly **112**.

A round spindle **134** is formed with a square opening **136** at one end thereof and cam ramp **138** near the other end thereof. As viewed in FIG. **1**, a turn button **140** has a square shank **142** which is located within an axial opening **144** of knob **24** and into square opening **136** of spindle **134**. The opposite end of round spindle **134** is formed with a cross link **145** which is inserted into an axial opening **147** (FIG. **3**) in the inboard end of plug **80**. Referring to FIGS. **1**, **2** and **3**, cam ramp **138** is located within opening **132** of housing **122**. When turn button **140** is rotated to lock lockset **20** from the interior side of a related door, or plug **80** is rotated to a locked position from the exterior side of the door, cam ramp **138** is positioned to prevent rotation of half-round spindle **130** by an attempt to rotate exterior knob **62**. This locking action is accomplished by cam ramp **138** engaging a follower surface **149** of locking slide **124** to move the slide so a notch **151** formed in the slide is positioned about a post extending from the inboard side of liner **70**.

It is noted that the ends of spring **126** rest normally against adjacent spaced sides of a pair of spaced lugs **153** (FIG. **3**) which extend in an axial direction from the inboard face of liner **70**. When knob **62** is operated, one or the other of the ends of spring **126** are moved toward the adjacent-most post **162**. If rotation of spindle **130** is not limited otherwise, the ends of spring **126** could engage the adjacent-most post **162** which would serve to limit normal operation of knob **62**.

As shown in FIG. **2**, a security shield **146** and a bearing **148** are located in axial alignment with other elements. Shield **146** is mounted in a fixed position and is formed with a circular rim **150**, a base plate **152**, and a pair of arcuate deflectors **154**. Base plate **152** is formed with an opening **156** for receipt of a portion bearing **148**.

In particular, half round spindle **130** is positioned through an opening **158** of bearing **148** and engages surfaces within the bearing opening to rotate the bearing upon rotation of the spindle. Bearing **148** is formed with lugs **159** (FIGS. **8** and **9**) which engage surfaces **161** (FIG. **6**) within opening **156** of base plate **152** to limit the rotary movement of the bearing. This limits the rotary movement of spindle **130** and, thereby, of exterior knob **62**. As viewed in FIG. **6**, a pair of projections **165** having curved surfaces **167** are formed radially inwardly from opposed sides of opening **156** and provide for surfaces **161**. Thus, opening **156** has a large diameter portion formed by the vertically spaced walls of the opening as viewed in FIG. **6** and a small diameter portion formed by oppositely spaced inward projections **165**.

As shown in FIG. **4**, a pair of screws **160** (FIG. **1**) are positioned through openings formed in rose cover **32**, rose liner **30**, stop plate **42**, cover **58**, shield **146**, door latch assembly **112** and into a pair of internally threaded posts **162** which extend from the inner face of rose liner **70**.

Referring to FIGS. **3** and **5**, a pair of diametrically opposed curved dimples **164** are formed in the outer surface of the periphery of an inward sleeve **166** of insert **64**. Also, a pair of diametrically opposed curved projections **168** are formed radially inwardly in shank **66** of knob **62**. Upon assembly, the curved projections **168** of knob **62** are positioned within the, curved dimples **164** of insert **64** to retain the knob with the insert. When a rotary force above a prescribed level is applied to knob **62**, projections **168** move out of dimples **164** to allow the knob to slip or rotate independently of insert **64**.

The components of lockset **20** can be assembled in two subassemblies at the manufacturing location. For example, a first subassembly includes the interior portion of lockset **20** containing interior knob **24** and the elements of FIG. **1**, and also containing cover **58** and retaining ring **60**. After assembly of these components, screws **160** are inserted through the aligned openings of the components and project from cover **58** in the manner illustrated in FIG. **4**. Thereafter, a pair of washer-like plastic retainers **163** (FIGS. **4** and **10**) are placed over the threaded ends of screws **160** and are moved adjacent cover **58** to retain the screws in place. Screws **160** are supported by the holes of liner **30** and cover **58** at spaced locations along the length of the screws so that the screws do not sag and pointed ends thereof are held in place and alignment for ready assembly within threaded posts **162**.

A second subassembly includes exterior knob **62**, together with the other components of FIG. **3**, and further includes lock housing **122**, slide **124**, spring **126**, slide **128**, half-round spindle **130**, round spindle **134**, shield **146** and bearing **148**.

In the past, knobs have been assembled with associated inserts by staking the knob sleeve to the insert. When unauthorized entry is attempted by turning the knob beyond its normal operating limit, the area of

staked connection would be destroyed and the knob would thereafter slip relative to the insert to preclude unauthorized entry. In this situation, portions of the lockset are destroyed and would have to be replaced. This could involve the ordering of replacement parts with the attendant disassembly and reassembly of the lockset, or the purchase of a new lockset and the attendant removal of the damaged lockset and assembly of the new lockset.

As shown in FIG. **5**, the pair of curved dimples **164** formed in sleeve **166** of insert **64** are each formed with a shallow depth with curving ramps which extend with a slight rise from the base of the dimple to the outer periphery of sleeve **166**. The curvature is determined by an arc of a circle which has a radius represented by the letter "r." In the preferred embodiment, the radius for the arc which relates to dimples **164** is 0.188 inch. Curved projections **168** which are formed inwardly in sleeve **166** of insert **64** are formed with a curvature complementary to dimples **164** determined by the value of radius "r" minus the thickness of sleeve **166**. In the preferred embodiment the thickness of sleeve **166** is 0.025 inch.

With the shallow curvature, there is sufficient frictional contact between dimples **164** and projections **168** to retain knob **62** in assembly with insert **64** during instances when the knob is used in normal fashion to retract latch bolt **114**. If forcible entry is attempted by twisting knob **62** beyond prescribed limits, projections **168** will be guided out of the shallow dimples **164** and onto the outer periphery of sleeve **166**. This action does not destroy dimples **164** or projections **168** but allows knob **62** to rotate freely with respect to insert **64**. Eventually, projections **168** could be re-inserted into dimples **164** and knob **62** thereby reassembled with insert **64** for normal use.

Referring further to FIG. **5**, a pair of pedestals **172** are formed along opposite wall portions within opening **111** of insert **64**. Half-round spindle **130** is positioned within opening **111** of insert **64** with portions of the spindle engaging pedestals **172**. Upon rotation of knob **62** in either direction, the pedestals **172** engage and urge spindle **130** to revolve about the axis of lockset **20** whereby bolt **114** is retracted.

Insert **26** is formed with an opening and pedestals in the same manner that insert **64** is formed with opening **111** and pedestals **172**. Thus, when knob **24** is rotated, half-round spindle **116** revolves about the axis of lockset **20** also to retract bolt **114**.

As shown in FIG. **4**, door latch assembly **112** includes bolt **114** mounted in a case **174** and extending from one end thereof. Frame **120** extends from the opposite end of case **174**. A spring **176** normally urges bolt **114** outwardly of case **174**. When either half-round spindle **116** or half-round spindle **130** are operated, a slide **178** located within frame **120** is moved in a direction away from case **174** and moves a latch cam **180** therewith. Latch cam **180** engages and moves a pair of followers **182** (one shown) to move a bolt extender **184** whereby bolt **114** is retracted into case **174**.

As further shown in FIGS. **2**, **4**, **11** and **12**, cover **58** is formed with a radially outward flange **186** and a hub **188** which is joined integrally with the flange. Hub **188** is formed with an axial opening **190** with a reinforcing rib **192** on the inner side of the hub. A pair of recessed areas **194** are formed inwardly in hub **188** and are formed with holes **196** for the passage of screws **160** therethrough. A pair of diametrically opposed slots **198** (FIGS. **1** and **11**) are formed in flange **186**.

As shown in FIGS. **3** and **4**, liner **70** is formed in a disk-like configuration with a circular sidewall or rim **200**. A pair of lugs **202** (FIG. **3**) extend radially inwardly from diametrically opposite sides of rim **200** and are located between the rim and the bases of threaded posts **162**.

In similar fashion, liner **30** is formed with a rim **204** (FIGS. **1** and **4**) and a pair of lugs (not shown) similar to lugs **202**. During assembly of the elements of lockset **20**, cover **58** is positioned with respect to liner **30** so that flange **186** fits under and radially inside of rim **204**. This precludes any radially lateral movement of liner **30** and cover **58** relative to each other. Also, slots **198** of cover **58** are located over the lugs of liner **30** to preclude relative rotation therebetween and also to locate a pair of screw holes **206** (FIGS. **1** and **4**) of the liner with screw holes **196** of the cover.

With this arrangement, a central opening **208** (FIG. **1**) of liner **30** provides a first bearing having a surface adjacent insert **26** while opening **190** of cover **58** provides a second bearing having a surface adjacent a bearing support surface on the insert which is spaced from the first bearing. It is noted that insert **26** is of sufficient length to receive the various elements assembled therewith. This includes liner **30** and cover **58** which provide the spaced bearing facility for the interior knob assembly.

In assembly, hub **188** of cover **58** is located within a complementary hole (not shown) in the door which precludes radially lateral movement of the cover relative to the axis of the hole. Since liner **30** and cover **58** cannot not move radially laterally relative to each other as described above, the liner is likewise precluded from radial movement relative to the axis of the door hole. Thus, the opportunity for lockset **20** to sag and expose the door hole is essentially eliminated. This precludes the opportunity for unauthorized entry by placement of an implement through the exposed door hole and subsequent operations of latch operating facilities.

Further, knob **24** is mounted on insert **26** which is provided with bearing support, as described above, by liner **30** and cover **58** at openings **208** and **190**, respectively. By virtue of the spaced bearing support for insert **26**, wobble of knob **24** is essentially precluded.

Referring to FIGS. **2**, **4**, **6** and **7**, shield **146** is formed with passageways **209** to facilitate positioning of the shield over threaded posts **162** of liner **70**. Further, shield **146** is formed with a pair of slots **210** on diametrically opposite sides of an outboard face of rim **150**.

During assembly of shield **146** with liner **70**, rim **150** of the shield is positioned within rim **200** of the liner so that there can be no relative radially lateral movement between the shield and the liner. Further, slots **210** of shield **146** are guided over lugs **202** of liner **70** to preclude relative rotation between the shield and liner. Also, this ensures proper alignment of liner **70** and shield **146** in addition to the alignment provided by threaded posts **162** and passageways **209**.

With this arrangement, half-round spindle **130** and round spindle **134** extend through opening **156** of shield **146** in a direction away from knob **62** to expose a free end of the spindles. However, opening **156** is larger than the combined cross section of spindles **130** and **134** so that no portion of the spindles engage the opening.

As viewed in FIGS. **2**, **8** and **9**, bearing **148** is formed with a flange **212** and a hub **214** extending from one side

thereof with the lugs **159** extending radially outwardly from the hub. Opening **158** is formed through bearing **148** and forms a pair of shoulders **218** and a generally semi-circular portion **220**.

In assembly, with hub **214** facing toward base plate **152**, bearing **148** is positioned on the free end of spindle **130** and moved over spindles **130** and **134** whereby spindle **130** fits into the semi-circular portion **220** with edges of spindle **130** being located adjacent shoulders **218**. Spindle **134** is located centrally within opening **158** but does not engage any of the wall thereof. Bearing **148** is moved further over spindles **130** and **134** whereby hub **214** fits into the small diameter of opening of shield **146** formed by oppositely spaced curved surfaces **167**. Also, lugs **159** fit into the space provided by the large diameter of opening **156** and are in position to engage surfaces **161**. However, half-round spindle **130** is adjacent the surface of semi-circular portion **220** of opening **158** which forms a bearing support surface.

With the subassembly complete, a first bearing is provided by liner **70** with a first bearing surface provided by opening **73** thereof which is adjacent insert **64**. A second bearing is provided by shield **146** with a second bearing surface being provided by the surface of the generally semi-circular portion **220** of opening **156** of bearing **148**. A bearing support surface is provided by half-round spindle **130**. It is noted that, in this arrangement, the first bearing is positioned adjacent insert **64** and the second bearing is positioned adjacent half-round spindle **130** which is spaced from the insert. By using this arrangement, first and second bearings are provided to essentially preclude the possibility of wobble of knob **62**.

Further, deflectors **154** of shield **146** fit snugly into the door hole and preclude radially lateral movement relative to the axis of the door hole. This arrangement essentially precludes sagging of lockset **20** to the extent that the door hole is exposed with its attendant disadvantages as described above.

Also, deflectors **154** extend over the internal mechanism within the door which operates bolt **114** to allow opening of the door. Deflectors **154** provide additional security by essentially precluding unauthorized placement of an implement behind liner **70** and into the door hole to operate the internal mechanism.

When knob **62** is operated, pedestals **172** (FIG. **5**) of insert **64** engage edges of half-round spindle **130** and revolve the spindle. As the spindle **130** is moved, bearing **148** is moved therewith until lugs **159** engage surfaces **161** of shield **146** to preclude further turning of knob **62**. Thus, bearing **148** functions as a bearing element and also serves as a travel limiting element for spindle **130** and knob **62**.

In general, the above described embodiments are not to be construed as limiting the breadth of the present invention. Modifications, and other alternative constructions, will be apparent which are within the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. A door lockset for assembly with a door, which comprises:

a latch bolt;

a bolt operating mechanism coupled to the bolt;

an operator subassembly assembled independently of the bolt and bolt operating mechanism, which comprises:

an operator located for coupling to the bolt operating mechanism and movable for actuating the bolt operating mechanism to move the bolt;

a support attached to the operator for movement therewith;

a first bearing member having a first bearing surface positioned adjacent the support;

a bearing support surface spaced from the first bearing member;

a second bearing member having a second bearing surface spaced from the first bearing surface and positioned adjacent the bearing support surface; and fastening and holding elements for retaining the first bearing member and the second bearing member in assembly with the door and in a spaced-apart position to provide bearing support for the door lockset.

2. The door lockset as set forth in claim **1**, which further comprises:

a spindle interposed between the support and the bolt operating mechanism; and

a portion of the spindle spaced from the support forming the bearing support surface.

3. A door lockset for assembly with a door, which comprises:

a latch bolt;

a bolt operating mechanism coupled to the bolt;

an operator coupled to the bolt operating mechanism and movable for actuating the bolt operating mechanism to move the bolt;

a support attached to the operator for movement therewith;

a first bearing member having a first bearing surface positioned adjacent the support;

a bearing support surface spaced from the first bearing member;

a second bearing member having a second bearing surface spaced from the first bearing surface and positioned adjacent the bearing support surface;

fastening and holding elements for retaining the first bearing member and the second bearing member in assembly with the door and in a spaced-apart position to provide bearing support for the door lockset; and

a bearing insert interposed between the second bearing member and the bearing support surface.

4. A door lockset for assembly with a door, which comprises:

a latch bolt;

a bolt operating mechanism coupled to the bolt;

an operator coupled to the bolt operating mechanism and movable for actuating the bolt operating mechanism to move the bolt;

a support attached to the operator for movement therewith;

a first bearing member having a first bearing surface positioned adjacent the support;

a bearing support surface spaced from the first bearing member;

a second bearing member having a second bearing surface spaced from the first bearing surface and positioned adjacent the bearing support surface;

fastening and holding elements for retaining the first bearing member and the second bearing member in assembly with the door and in a spaced-apart position to provide bearing support for the door lockset; and

wherein the second bearing member has portions thereof which are positioned within a recess of the first bearing member so that the first and second bearing members are precluded from moving laterally with respect to each other.

5. The door lockset as set forth in claim 4 wherein the door has a hole formed therein and the second bearing member is formed with structure which is complementary to and fits into the hole of the door to preclude lateral movement of the second bearing member.

6. A door lockset for assembly with a door, which comprises:

a latch bolt;

a bolt operating mechanism coupled to the bolt;

an operator coupled to the bolt operating mechanism and movable for actuating the bolt operating mechanism to move the bolt;

a support attached to the operator for movement therewith;

a first bearing member having a first bearing surface positioned adjacent the support;

a bearing support surface spaced from the first bearing member;

a second bearing member having a second bearing surface spaced from the first bearing surface and positioned adjacent the bearing support surface;

fastening and holding elements for retaining the first bearing member and the second bearing member in assembly with the door and in a spaced-apart position to provide bearing support for the door lockset; and

wherein the support is an insert which is positioned within a portion of the operator and wherein the first bearing member and the second bearing member are positioned adjacent spaced locations of the insert which provides spaced bearing support for the first and second bearing members.

7. The door lockset as set forth in claim 6 wherein spaced portions of the first and second bearing members are formed with aligned holes for supporting therein at least one screw at spaced locations so that the screw is retained in accurate axial alignment with the aligned holes.

8. The door lockset as set forth in claim 7 which further comprises a screw retainer to hold the screw in assembly with the spaced bearing members pending assembly of the screw with a threaded receptor of the lockset.

9. A door lockset for assembly with a door, which comprises:

a latch bolt;

a bolt operating mechanism coupled to the bolt;

an operator coupled to the bolt operating mechanism and movable for actuating the bolt operating mechanism to move the bolt;

a spindle having a half-round cross section interposed between the operator and the bolt operating mechanism and movable with movement of the operator;

an attachment formed with an opening of a shape complementary to the cross section of the spindle for form fit of the spindle within the opening of the attachment for movement therewith and the attachment formed with a projection extending therefrom; and

a stop surface positioned fixedly in a path of movement of the projection for limiting movement of the attachment and spindle and thereby the operator.

10. The door lockset as set forth in claim 9 wherein the attachment is formed by an insert which is formed with a central opening for frictional receipt of the spindle and with at least one surface within the opening which engages an edge of the spindle for movement with the spindle, and the projection is at least one lug which extends from a portion of the insert.

11. The door lockset as set forth in claim 9 wherein the projection includes a pair of spaced lugs which extend from one surface of the attachment.

12. A door lockset for assembly with a door, which comprises:

a latch bolt;

a bolt operating mechanism coupled to the bolt;

an operator coupled to the bolt operating mechanism and movable for actuating the bolt operating mechanism to move the bolt;

a spindle interposed between the operator and the bolt operating mechanism and movable with movement of the operator;

an attachment positioned on the spindle for movement shape complementary to the cross section of the spindle for form therewith and formed with a projection extending therefrom;

a stop surface positioned fixedly in a path of movement of the projection for limiting movement of the attachment and spindle and thereby the operator;

a plate held in fixed position in its assembly with the door lockset and with the door;

an opening formed through the plate;

the spindle being located for rotation within and through the opening of the plate;

at least one surface of the plate extending into the opening of the plate which forms the stop surface;

the attachment formed by an insert having an opening for receipt of the spindle;

the insert mounted within the opening of the plate for rotary movement with the spindle and within the opening of the plate; and the projection formed by at least one lug which also extends into the opening of the plate in a path including the stop surface for limiting rotary movement of the insert, spindle and operator upon rotation of the operator.

13. The door lockset as set forth in claim 12, which further comprises:

a pair of spaced deflectors extending from one side of the plate and about the bolt operating mechanism to shield the mechanism from tampering.

14. The door lockset as set forth in claim 12 wherein the opening of the plate is formed with a large diameter portion formed by diametrically and oppositely spaced walls; the opening of the plate is formed further with a small diameter portion formed by diametrically and oppositely spaced projections which extend into the opening of the plate and which have curved interfacing edges.

15. The door lockset as set forth in claim 14 wherein the insert is located for rotation within the small diameter portion as defined by the curved interfacing edges of the projections and the lug is located for movement in the large diameter portion.

16. The door lockset as set forth in claim 12 wherein the insert is formed with a flange which engages the plate adjacent the opening of the plate to preclude movement of the insert beyond the plate.

17. A door lockset for assembly with a door, which comprises:

a latch bolt;

a bolt opening mechanism coupled to the bolt;

an operator for actuating the bolt operating mechanism to move the bolt;

the operator formed with a hand-gripping portion and a shank integrally joined with the hand-gripping portion at one end of the shank, an opposite end of the shank being a free end;

a coupler attached to the shank of the operator for facilitating the coupling of the operator to the bolt operating mechanism and formed with a first end and a second end;

the coupler being formed with a depression of a prescribed configuration intermediate to and spaced from the first and second ends thereof;

the shank of the operator being formed with a projection of the prescribed configuration intermediate the one end and the free end thereof and in complementary assembly with the depression of the coupler; and

the depression of the coupler having a coupler surface portion in engagement with an operator surface portion of the projection of the operator whereby normal operation of the operator results in movement of the coupler therewith.

18. The door lockset as set forth in claim 17 wherein the depression of the coupler is a dimple formed in an exterior surface of the coupler and the projection of the operator extends inwardly from an interior surface of the operator and fits in complementary fashion into the dimple.

19. The door lockset as set forth in claim 18 wherein the dimple is formed with a shallow depression having curved ramps extending from opposite sides of a base of the shallow depression and the projection of the operator has complementary structure which fits into the shallow depression.

20. The door lockset as set forth in claim 17 wherein frictional engagement between the coupler surface portion and the operator surface portion allows the coupler and the operator to move together when a force up to a prescribed level is applied to the operator and allows the operator surface portion to glide in a non-destructive manner out of engagement with the coupler surface portion when a force above the prescribed level is applied to the operator whereafter the operator is movable freely of the coupler.

* * * * *

United States Patent [19]

Dietrich et al.

[11] **4,108,482**

[45] **Aug. 22, 1978**

[54] **DISENGAGING SPINDLE LOCKING MECHANISM**

[75] Inventors: **Hagen Dietrich, Delta; William J. Fane, North Vancouver; Joseph Potschka, Vancouver, all of Canada**

[73] Assignee: **Norris Industries, South Gate, Calif.**

[21] Appl. No.: **843,939**

[22] Filed: **Oct. 20, 1977**

[51] Int. Cl.[2] **E05B 55/06**

[52] U.S. Cl. **292/165;** 70/472; 70/149; 70/218; 292/169.16; 292/336.5; 292/DIG. 27

[58] Field of Search 292/165, 169.16, 169.18, 292/169.22, 336.5, DIG.27; 70/471, 472, 486, 487, 149, 218, 222, 223

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Primary Examiner—Rodney H. Bonck

[57] **ABSTRACT**

A disengaging spindle locking mechanism for the latch bolt of a mortise type lock is actuated by the locking slide which is normally employed to engage a retractor hub to prevent the hub from being rotated. At the inner end of a split spindle where it is in non-rotatable engagement with the retractor hub there is a cam surface. On the inner end of a locking slide is a cam surface which cams the spindle out of engagement with the hub as hub action is blocked by the slide. Thereafter, should force be applied to the spindle, it will merely spin in place and no damage will be done to the lock mechanism such as might otherwise be done by unauthorized persons to force open the lock.

9 Claims, 5 Drawing Figures

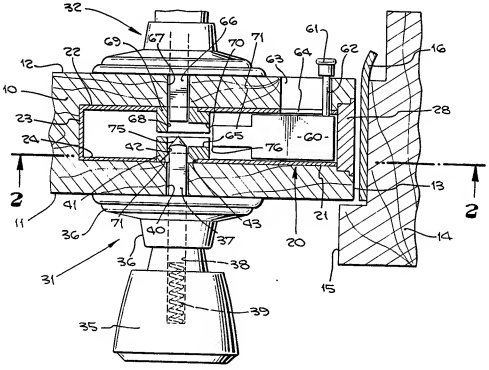

Fig. 1.

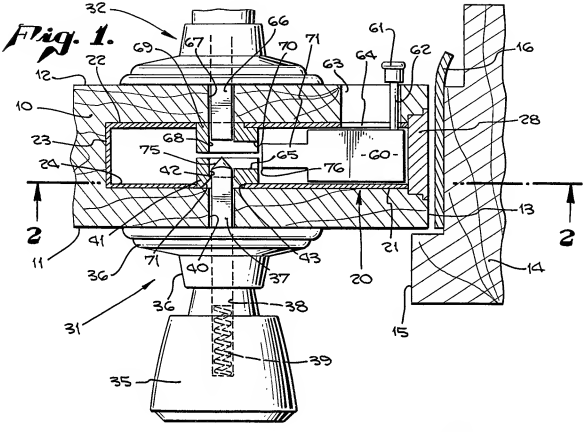
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Fig. 2.

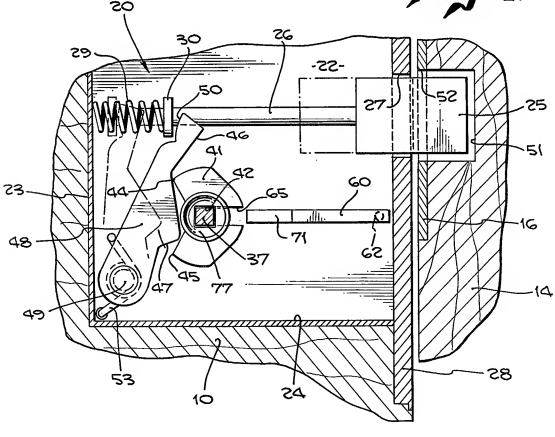
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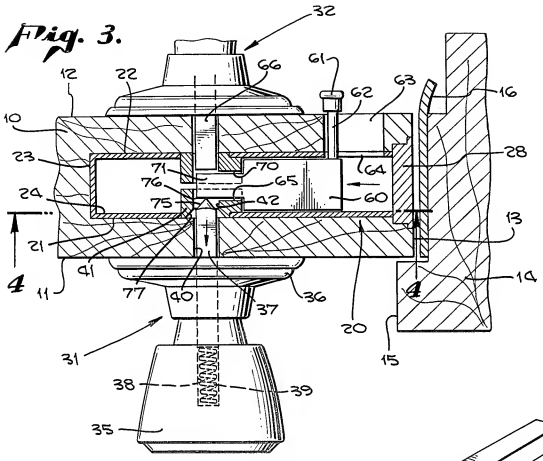
Fig. 3.



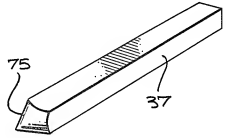
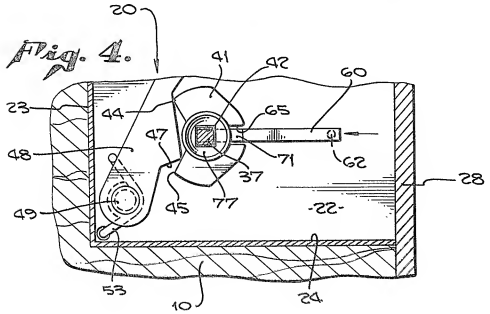


Fig. 5.

Fig. 4.



DISENGAGING SPINDLE LOCKING MECHANISM

Despite the advantages of security in mortise type locks, wherein a latch bolt of the reciprocating type is so arranged as to penetrate rather deeply into a latch bolt aperture in the strike plate, knowledgeable unauthorized persons are still tempted to manipulate the lock in order to gain a forcible entry. In some locks of the kind made reference to, of which a mortise type lock is a typical example, the lock mechanism can sometimes be damaged sufficiently to make it possible for such an unauthorized person to withdraw the latch bolt far enough to force the door open. Such forcible entry is easier when the handhold secured to a conventional spindle on the exterior of the trim is a lever type handhold which gives such person appreciable mechanical advantage to forcibly rotate the spindle and in that way to damage the mechanism. Even without such a mechanical advantage being present, a conventional round knob can be rotated with considerable force by application of a pipe wrench.

Some expedients undertaken to overcome the disadvantage have been to appreciably strengthen the locking mechanism making all relatively moving parts heavier and stronger, sufficient at least to minimize the damage when a lever handle is rotated forcibly to gain unauthorized entry. Another remedy has been to add a complicated overload release apparatus. Although the latter expedient can often be counted upon for effectiveness, there is appreciable cost involved in supplying such additional overload release parts as well as the cost of assembling them in a lock with sufficient accuracy to have them dependable. Both expedients which have been made reference to add materially to the cost of manufacture which ultimately must be passed on to the purchaser.

It is, therefore, among the objects of the invention to provide a new and improved non-complicated mechanism with attendant low cost, capable of nullifying the damaging effect of forcibly rotating the handhold and attached spindle in order to gain forcible entry.

Another object of the invention is to provide a new and improved disengaging spindle locking mechanism for a latch bolt which is locked by lever action which is of such character that when locked, the spindle attached to the outside handhold is completely disengaged, but so arranged that once the mechanism has been unlocked, reengagement takes place instantly and automatically.

Still another object of the invention is to provide a new and improved disengaging spindle locking mechanism for a latch bolt which is capable of completely and effectively disengaging the spindle from the latch retracting mechanism by merely a relatively minor structural revision of the necessary elements of the locking mechanism, whereby to minimize the number of parts and the accompanying cost.

Still further among the objects of the invention is to provide a new and improved disengaging spindle locking mechanism for a latch bolt in an arrangement which gives positive assurance of the handhold being disconnected on all occasions when the latch bolt is secured in locked position, the rearrangement further being such that only relatively minor changes need to be made in conventional locking mechanisms.

With these and other objects in view, the invention consists of the construction, arrangement, and combination of the various parts of the device serving as an example only of one or more embodiments of the invention, whereby the objects comtemplated arc attained, as hereinafter disclosed in the specification and drawings, and pointed out in the appended claims.

FIG. **1** is a horizontal sectional view through a fragment of doorway and accompanying jamb showing a lock provided with the disengaging spindle locking mechanism in unlocked condition.

FIG. **2** is a vertical sectional view taken on the line 2—2 of FIG. **1**.

FIG. **3** is a sectional view similar to FIG. **1**, but showing the device in locked condition.

FIG. **4** is a sectional view taken on the line 4—4 of FIG. **3**.

FIG. **5** is a perspective view of a typical spindle used in the device.

In an embodiment of the invention wherein the basic essentials of a characteristic mortise type lock have been shown by way of example of many locks of this same general character, there is shown a door **10** having an outer face **11**, an inner face **12** and an edge face **13**. The door **10** is shown in cooperation with a jamb **14** having a stop **15** and a strike plate **16**.

A mortise type lock, indicated generally by the reference character **20**, is shown contained in a housing serving as a frame comprising in the chosen example an outside wall **21**, an inside wall **22** and an end wall **23**. The housing is adapted to fit within a substantially rectangular recess **24** which extends inwardly from the edge face **13** of the door.

The mortise type lock is provided with a latch bolt consisting of a latch bolt head **25** and a shaft **26**, the latch bolt being reciprocatably mounted in the housing which serves as a frame, mounting details having been omitted in the interest of simplicity. The latch bolt head is adapted to extend through a hole **27** in a front edge plate **28** which is part of the housing of the mortise type lock.

In one form of mounting such as that shown, there may be provided a compression spring **29** acting between the end wall **23** and a collar **30** on the shaft **26** biased in a direction extending the latch bolt to locked position, as shown in FIG. **2**.

For manipulating the latch bolt, there is provided an outside trim **31** and an inside trim **32**. In the chosen embodiment the outside trim **31** is shown served by a handhold in the form of a knob **35** rotatably mounted on an outside rose assembly **36** which is fastened to the door in a customary conventional fashion. An outside spindle **37**, non-circular in cross section, has an axially slidable engagement with the outside knob **35**, but due to its non-circular shape and fitting within a non-circular opening **38** is in non-rotatable engagement with the knob **35**. A coil compression spring **39** in the opening **38** acting between the bottom of the opening and the outside end of the spindle **37** is biased in a direction urging the spindle axially inwardly toward the mortise type lock **20**. In the chosen embodiment the non-circular shape of the spindle and its opening is square. The shape, however, can be virtually any other non-circular shape, such, for example, as hexagonal, multi-sided, or knurled, so long as it provides a clutch type non-rotatable engagement and is capable of sliding in an axial or endwise direction.

The outside spindle **37** is of such length that it extends through a hole **40** in the door inwardly to a position within the mortise type lock where it is in axially slid-

able and non-rotatable engagement with a hub **41**, by virtue of engagement in a non-circular opening **42** in the hub.

The hub **41** has a rotatable mounting in a recess **43** in the outside wall **21** of the housing. When the hub **41** is rotated, either clockwise or counter-clockwise by manipulation of the knob **35**, the hub **41** is rotated in a corresponding direction such that the shoulder **44** or the shoulder **45** as the case may be moves against a corresponding cam track **46** or **47** causing counter-clockwise rotation as viewed in FIG. 2 of a retract arm **48** about its pivot point **49** in the mortise type lock housing. When moved as described, a cam follower **50** at the end of the retract arm **48** moves against a corresponding side of the collar **30** which shifts the latch bolt in a direction from right to left as viewed in FIG. **2**, for example, thereby to withdraw the latch bolt head **25** from latch bolt holes **51** and **52** respectively in the jamb **14** and strike plate **16**. When the knob **35** is released, a torsion spring **53** acting between the mortise lock housing and the retract arm **48** causes the retract arm to move in a clockwise direction as viewed in FIG. **2**, which has the effect in acting upon the hub **41** to return it to initial position. At the same time, energy stored in the spring **29** serves to return the latch bolt to the extended locked position of FIG. **2**.

To hold a latch bolt in the locked position, there is provided a locking slide **60**, the locking slide being mounted in the housing of the mortise lock in a substantially conventional fashion in which mounting it can be manipulated, by way of example in the embodiment shown, by a locking button **61**, a shank **62** of which extends through an opening **63** in the door and a corresponding opening **64** in the inside wall of the mortise lock so that the locking button can be manipulated from the inside.

In order for the locking slide to block rotation of the hub **41** and consequently prevent withdrawal of the latch bolt to unlocked position, there is provided in the hub **41** a radially extending locking slot **65**. The slot **65** extends all the way from the exterior into communication with the non-circular opening **42** within the housing, in which the spindle **37** is located.

Also by way of example, for manipulating the latch bolt by operation of the inside trim **32**, the inside trim is provided with a spindle **66** corresponding in general shape and size to the spindle **37**. The spindle **66** extends through a hole **67** in the door **10** and into a similarly shaped non-circular opening **68** in an inside hub **69**. Like the outside hub **41**, there is provided in the inside hub a radially extended slot **70** which is also adapted to accommodate the locking slide **60**. More particularly, the locking slide has a reduced end portion **71** which is the part depended upon to simultaneously enter the radially extending slots **65** and **70**. Therefore, when the reduced end portion **71** is projected into the slots **65** and **70**, rotation of both the hub **14** and the hub **69** is blocked, and the latch bolt head **25** cannot be withdrawn. To unlock the lock, permitting withdrawal of the latch bolt head, all that is necessary is to shift the locking button **61** in a direction from left to right as viewed in FIG. **1**. This motion frees the reduced end portion **71** from engagement with the hubs and manipulation of either the outside knob **35** or an appropriate handhold on the inside trim **32** withdraws the latch bolt head so that the door can be opened.

To prevent mutilation of the locking mechanism by application of unauthorized force to the outside handhold such, for example, as the knob **35**, or a lever handle which might be substituted for the knob **35**, the mechanism is such as to shift the outside spindle **37** out of engagement with the outside hub **41**. Shifting of the spindle is accomplished by providing at the inside end of the spindle a conical end which results in an oblique face **75** serving as a cam follower, facing the inside end of the reduced end portion **71** of the locking slide **60**. A corner **76** on the reduced end portion serving as a cam surface is adapted to engage the oblique face, acting as a cam track or cam way when the locking slide is shifted inwardly to locking position. The camming action thus created serves to shift the outside spindle **37** axially outwardly. Additionally, by providing a countersunk or recessed portion **77** around the non-circular opening **42** in the hub **31**, the length of the non-circular opening **42** is shortened appreciably. This serves to minimize the distance outwardly which the outside spindle **37** must travel in order to free the spindle from engagement with the hub. The position just described is shown in FIG. **3**, this being locked position. As a consequence, should force be applied to the outside trim as, for example, application of a pipe wrench to the knob **35**, the knob will freely spin, since there is no engagement of the spindle with the hub. As a result, no amount of force can be applied sufficient to mutilate the interior locking mechanism and the latch bolt then remains securely locked. Conversely, when the locking slide is withdrawn by manipulation of the locking button **61**, the reduced end portion **71** is extracted from the slots in the hubs and by action of the spring **39** the spindle **37** is returned to a position of engagement with the corresponding hub **41** and the outside knob can again be used to withdraw the latch bolt.

Although in the chosen embodiment the inside spindle **66** has not been shown as being provided with the same oblique face as the outside spindle **37**, the same construction can be used. Such an expedient might be found desirable under some circumstances, as, for example, when a key action might be substituted for the locking button **61**. The inside end of the spindle providing the oblique face **75** might also assume other appropriate configurations providing an oblique face for engagement with the locking slide **60** where a cam surface, acting in substantially the same fashion as the corner of cam surface **76** might be given some other physical configuration.

Having described the invention, what is claimed as new in support of Letters Patent is as follows:

1. In a lock mechanism comprising a frame, a reciprocating latch bolt mounted in the frame, a retract arm movably mounted on the frame in a position of engagement with the latch bolt for withdrawing said latch bolt and a retract hub having a rotatable mounting on the frame in operating engagement with the retract arm, a disengaging spindle locking mechanism for guarding the hub against unauthorized rotation comprising a locking slide having a reciprocatable mounting on the frame, a shoulder on the hub adapted to engage the slide in locking position, means forming a non-circular opening in said hub, a spindle having an axially movable non-rotatable engagement with the non-circular opening in the hub for rotating said hub through a latch bolt actuating cycle, a first cam element on said spindle, a second cam element on an adjacent portion of said slide, said spindle being subject to axial movement by action of said cam elements to a position of disengagement

from said hub, whereby to permit rotation of the spindle independent of the hub.

2. A disengaging spindle locking mechanism as in claim 1 wherein said spindle has an inside end located in said hub and said first cam element comprises a cam way at the inside end of the spindle oblique relative to the long axis of the spindle.

3. A disengaging spindle locking mechanism as in claim 2 wherein said non-circular opening in the hub has a countersunk side structure on the side facing outer axial movement of the spindle and adapted to engage said cam way upon movement of the spindle axially in response to action of the locking slide.

4. A disengaging spindle locking mechanism as in claim 1 wherein said second cam element comprises a cam surface on the inside end of the locking slide.

5. A disengaging spindle locking mechanism as in claim 1 wherein said first cam element comprises an oblique face on the inside end of said spindle and said second cam element comprises a shoulder on the inside end of said locking slide.

6. A disengaging spindle locking mechanism as in claim 1 wherein said hub has a radially open slot forming said shoulder on the hub and adapted to receive said locking slide.

7. A disengaging spindle locking mechanism as in claim 1 wherein said second cam element comprises a portion of the locking slide of reduced size and there is a slot in the hub forming said shoulder.

8. A disengaging spindle locking mechanism as in claim 1 wherein there is a spring means acting axially inwardly on the spindle whereby to bias said spindle toward hub engaging position.

9. A disengaging spindle locking mechanism as in claim 1 wherein there is a torsion spring acting on said retract arm in a direction for moving the hub to a latch bolt extended position.

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